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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/537,161

05/31/2005

Kazuhiko Fukutani

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

BERDICHEVSKY, MIRIAM

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

05/13/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/537,161	Applicant(s) FUKUTANI ET AL.	
	Examiner MIRIAM BERDICHEVSKY	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on election 2/4/2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/31/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/31/2005, 6/5/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of group I (claims 1-17) in the reply filed on 2/4/2009 is acknowledged.
2. This application contains claims 18-20 drawn to an invention nonelected with traverse in the reply filed on 2/4/2009. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01. As per the election dated 2/4/2009 claims 18-20 are considered withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group II a TE conversion device, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 8-9 and 16-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claims 8-9 recite the limitation "a main component other than oxygen is..." in lines 2-3. Neither claims 1 nor 8-9 teach that oxygen is a main component. The claim would be more clearly written as, for example, "the two main components are oxygen and silicon (claim 8)/germanium (claim 9).

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6. Claims 16-17 recite the limitation "the chemical treatment" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 17 is rejected as being dependent from claim 16.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 3-6, 8, 10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Ying (US 6231744).

As to claim 1, Ying teaches a porous body having columnar pores and a semiconductor material in the pores of the porous body (figure 1) (col. 9, lines 22-37). The Examiner notes that the limitation regarding the formation of the porous body are not given patentable weight because the claim is a product by process claim and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process (MPEP 2113).

Regarding claim 3, Ying teaches that the porous body is in a thin film (col. 9, lines 5-10)

Regarding claims 4-5, the limitation regarding for treating the porous body is a product by process claim and is thus not given patentable weight. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process (MPEP 2113).

Regarding claims 6 and 8, Ying teaches that the porous body can be made of mesoporous silica. Silica contains between 20 and 70 atomic percent silicon (col. 9, lines 15-22).

Regarding claim 10, Ying teaches that the average diameter of the columns (pores) is 8nm (col. 6, lines 23-26).

Regarding claim 13, Ying teaches a thermoelectric conversion device using the material according to claim 1 (col. 9, lines 22-37).

9. Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Lieber (US 20020130311).

As to claim 2, Lieber teaches an elongated semiconductor material (figure 6). The Examiner notes that the limitations regarding the porous body are not given patentable weight because the claim is a product by process claim and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the

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same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process (MPEP 2113).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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13. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ying as applied to claim 1 above.

Regarding claim 11, Ying teaches keeping the cell size (figure 2: spacing + column/pore diameter) small (col. 11, lines 40-48) and teaches that the cell size can be manipulated by voltage (col. 12, lines 1-26) but is silent to a spacing of between 5 and 20nm.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a spacing of between 5 and 20nm in Ying because to optimize the nanowire growth template especially since it has been held to be within ordinary skill of a worker in the art to determine the optimal value of a result effective variable (MPEP 2144.05). Too small a spacing risks malformed pores while too large of a spacing lessens the density of wires produced by a single template.

14. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying as applied to claim 1 above and further in view of Someya (US 20030147801) and Doremus (Glass Science).

Regarding claims 7 and 9, Ying teaches the use of anodized aluminum or silica in the manufacture of nanostructures (col. 9, lines 8-20) as the second component but is silent to the second component being germanium at 20 to 70at% and having oxygen and germanium as the main components.

Someya teaches that silica glass and anodized aluminum are art recognized equivalents in the manufacture of nanostructures ([0016]).

Doremus teaches that silica glass and germania glass are art recognized equivalents (page 38). Germania glass has 20 to 70at%. Use of germania glass would result in oxygen and germanium being the main components.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use germania glass in Ying because germania glass is similar in structure to silica glass, as taught by Doremus such that use of the material would have been obvious to try with reasonable predictions of success and predictable results (MPEP 2141 III).

15. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ying as applied to claim 1 above and further in view of Someya.

Regarding claim 12, Ying teaches the use of anodized aluminum or silica in the manufacture of nanostructures (col. 9, lines 8-20) as the second component but is silent to the second component being amorphous.

Someya teaches that silica glass and anodized aluminum are art recognized equivalents in the manufacture of nanostructures ([0016]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use glass in Ying because glass is an art recognized equivalent of anodized alumina, as taught by Someya such that use of the material would have been obvious to try with reasonable predictions of success and predictable results (MPEP 2141 III) and because amorphous materials are cheaper than crystalline materials.

16. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying and Someya.

As to claim 14, Ying teaches a method of manufacturing a thermoelectric material comprising:

- Providing a structure in which a plurality of columns of a column forming material containing a first component distributed in a matrix containing a second component (figure 1).
- Removing the column forming material to form a porous body (figure 1, (col. 5, lines 14-40)
- Introducing a semiconductor material into the porous body (col. 5, line 43 to col. 6, line 5)

Ying is silent to the two components being different such that there is a eutectic between the components.

Someya teaches that anodized aluminum and silica-alumina are art recognized equivalents in the manufacture of nanostructures ([0016]). Silica is eutectic with alumina.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use silica-alumina in Ying because silica-alumina has heat, acid and alkali stability as taught by Someya ([0016]) and use of the material would have been obvious to try with reasonable predictions of success and predictable results (MPEP 2141 III).

Regarding claims 15-16, Ying teaches oxidizing the porous body after the removal step (col. 5, lines 22-25).

Regarding claim 17, Ying teaches filling the pores using electrodeposition (col. 9, lines 45-50).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MIRIAM BERDICHEVSKY** whose telephone number is (571)270-5256. The examiner can normally be reached on M-Th, 10am-8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795